

City of Rio Vista Urban Water Management Plan 2010

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1. Introduction:

Water Code sections 10620 and 10621 require all “urban water suppliers” to prepare and adopt an urban water management plan and to update that plan every five years. Due to recent increases in its population, the City of Rio Vista (City) now qualifies as an urban water supplier as defined in California Water Code section 10617 because the City is a public agency directly providing water for municipal purposes to more than 3,000 customers. Accordingly, the City has prepared this Urban Water Management Plan (UWMP).

This UWMP has been prepared in conformance with the California Urban Water Management Planning Act, Water Code section 10610 et seq. (UWMP Act). In Water Code section 10610.4 of the Act, the Legislature declared:

- (a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.
- (b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.
- (c) Urban water suppliers shall be required to develop water management plans to actively pursue the efficient use of available supplies.

The Legislature has amended the UWMP Act several times, most recently in 2009. The 2009 amendments added several additional requirements and elements to urban water management plans. As these amendments signify, urban water management is an increasingly complex field and can be very costly depending on the technology and precision desired. However, the level of precision and sophistication required by a particular water supplier depends largely on the size of the water service area and the complexity of the water supplies and infrastructure used to acquire, store, treat, and convey those supplies to individual water users within that supplier’s service area. In general, the larger and more diverse a water supplier’s system, service area, and population are, the more cost and effort required and invested in water planning. The Legislature recognized this reality by stating that its intent in enacting the UWMP Act was “to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied.” Water Code § 10630.

1.1 Coordination

During the preparation of the 2010 UWMP, the City coordinated and exchanged information with Solano County and the Solano County Water Agency. Solano County was contacted 60 days prior to a public hearing to review the 2010 UWMP, and 60 days after the submission of the 2010 UWMP to the California Department of Water Resources (DWR) as per California Water Code sections 10621(b) and 10635 (b). *See Supporting Documents and Correspondence in Appendix A and Table 1 in Appendix E.*

1.2 Plan Adoption, Submittal, and Implementation

As indicated, the UWMP Act requires each urban water supplier to adopt and implement its UWMP every five years. This process involves public review of the UWMP, revisions, and adoption by the governing body of the water supplier. Rio Vista's 2010 UWMP will be available for public review at the Public Works Department at Rio Vista City Hall after adoption and submission to the California Department of Water Resources. Water Code § 10645. The City's 2010 draft UWMP was reviewed by the City Council and general public during a public review meeting at the June 16, 2011 City Council Meeting.

The Rio Vista City Council adopted the 2010 UWMP by resolution at its August 18, 2011 public meeting. *See Resolution to Adopt the 2010 UWMP in Appendix A.*

The 2010 UWMP will be sent to DWR, the California State Library, and Solano County within 30 days after adoption. *California Water Code section 10644(a). See Supporting Documents Appendix A.*

2. System Description:

2.1 Service Area Physical Description

The City of Rio Vista is located 48 miles southwest of Sacramento and 65 miles northeast of San Francisco. The City was incorporated on December 30, 1893. There are currently 4,225 acres of land within the City's water service boundary, of which 2,213 are currently developed. *See Water Service Boundary Map in Appendix D.*

The City provides a small town atmosphere that includes a mix of rural and suburban lifestyles, but provides easy access to the larger urban amenities found in San Francisco and Sacramento. Rio Vista lies on the banks of the Sacramento River and is an easy drive to the Napa Wine Country, Sierra ski resorts, and Lake Tahoe.

In addition to the town proper, the City's Planning Area includes unincorporated surrounding areas located within the City's sphere of influence. These unincorporated areas may, in the future, request services from, or annexation to the City. The City's full planning area includes approximately 4,225 acres of unincorporated land.

The table below shows climatic information. The average rainfall and average temperature information comes from the National Weather Service from the Antioch Pump Plant 3 data center (period of record 1955 – 2010). The evapotranspiration data comes from the Twitchell Island California Irrigation Management Information System (CIMIS) Station.

Climate

	Jan	Feb	Mar	Apr	May	Jun	
Standard Monthly Avg. ETo	1.59	2.20	3.65	5.08	6.83	7.80	
Avg Rainfall (inches)	2.80	2.43	1.93	0.88	0.38	0.10	

Ave Temp (F)	45.3	50.6	54.4	58.8	64.85	71.1	
	July	Aug	Sep	Oct	Nov	Dec	Annual
Standard Monthly Avg. ETo	8.67	7.81	5.67	4.03	2.12	1.59	57.06
Avg Rainfall (inches)	0.02	0.05	0.21	0.70	1.66	2.12	13.28
Avg Temp (F)	74.1	7.34	70.7	63.9	53.5	45.9	60.5

2.2 Service Area Population

Water Code section 10631(a) requires projected population estimates in five year intervals. Table 2 in Appendix E presents the current and projected population of the City through 2030. As indicated, between 2010 and 2030, the City's population is expected to almost double, increasing from 8,324 to 14,600 residents. The City obtained these population estimates from the State of California Department of Finance and the Association of Bay Area Governments. *For past population estimates see Appendix D "Table 2: E-4 Population Estimates for Cities, Counties and State, 2001-2010 with 2000 Benchmark".*

Solano County requires that any urban development be annexed to a city (Solano County Orderly Growth Initiative, 1994). There are no urban populations in the unincorporated areas of Solano County. This initiative will continue to place annexation pressure on the City as undeveloped areas in the City's sphere of influence continue to develop.

3. System Demands:

3.1 Water Demands

Residential consumption was, is, and will continue to be the primary beneficial use of water served by the City. Other beneficial uses include commercial and governmental functions within the City.

The City does not currently sell any water supplies to other agencies and it has no plans to do so in the future. The City does not incur additional water losses or use water for the creation of saline groundwater barriers, groundwater recharging, or water recycling. The City monitors its water supply and infrastructure, and is constantly engaged in repairing and maintaining that infrastructure. However, the City does not currently have the resources to establish a program for determining overall system losses. Any system losses that occur would, however, be reflected and incorporated into the City's overall water use and pumping data. *See Tables 3-7, 9-11 in Appendix E.*

Planned Growth and Development

The City adopted its most recent General Plan on July 18, 2002. Among other land uses, that plan included zoning for residential, commercial, and industrial development. As these developments are proposed, constructed, and come on line, they will comprise much of the

City's projected increase in population and water demands. Several projects that could significantly contribute to the City's future projected population and water demand growth have been proposed and are currently in the City application and/or environmental review stages.

These include:

- The Del Rio Hills project, a mixed use project consisting of up to 2,500 residential units and 315,000 square feet of commercial uses, as well as required schools and parks, on approximately 505 acres in the City of Rio Vista, immediately east of unincorporated Solano County.
- Brann Ranch Project: Approximately 860 single-family dwellings are planned in this residential development located south of Liberty Subdivision, between Highway 12 and Liberty Island Road.
- Liberty Project: Approximately 929 single-family dwellings are planned in this residential subdivision located northwest of Trilogy, on the westerly side of the City between Liberty Island Road and both sides of McCormack Road.
- Riverwalk Project: Riverwalk is an approved 236-acre Planned Unit Development north and east of the intersection of Highway 12 and Church Road. The Riverwalk Project would consist of approximately 783 single-family homes and 240 multi-family residential units, as well as commercial and open space development. The project is proposed to be carried out in six phases.

As stated, these developments were included in the City's future water use projections in this UWMP because they represent reasonably foreseeable planned growth within the City's current zoning as adopted in its current General Plan. As these developments get closer to completion, additional water supply analyses will likely be performed pursuant to the California Environmental Quality Act process and other California water adequacy laws (e.g., SB 610, SB 221, etc.).

3.2 Baselines and Targets

Baseline and Target numbers were based on the requirements outlined in the 2010 Urban Water Management Guidebook, Section II, part M. As shown in Tables 13 and 14, the City's base daily per capita water use for the 10-year period 2000-2009 was 320 gpcd. During the 5-year period 2005-2009, the base daily per capita water use declined slightly to 314 gpcd. The City used the metered water pumping data obtained at the individual well sites located in the service area. The aggregate total is reflected in the tables used to determine baselines and targets. *See Tables 13 and 15 in Appendix E.*

Based on Methodology 3 – Base Daily Per Capita Water Use, the City of Rio Vista has a 2020 gpcd target of 256 gpcd. The City's minimum water use reduction requirement is 298 gpcd. In 2009, the City's daily per capita water use was 274 gpcd, which serves as the compliance daily per capita water use value for the last year in the reporting period.

3.3 Water Demand Projections

Rio Vista does not currently and does not intend to rely on any wholesale water distributor to meet demands through 2030. Therefore, no projected data has been provided to any wholesale water agency and Table 12 contains no estimates of such reliance. Water Code § 10631(k). *See Table 12 in Appendix E.* It should be noted, however, that as explained in Section 4.1 and 4.3, the City has a contract right to up to 1,500 acre-feet from the Solano County Water Agency North Bay Aqueduct deliveries of State Water Project supplies, which may offer innovative means to deal with unexpected supply shortages, even though not technically available until 2016 and not projected to be needed to meet planned growth through 2030.

3.4 Water Use Reduction Plan

Water Code section 10608.36 requires urban wholesale water suppliers to include in their UWMPs an assessment of present and proposed measures to help achieve the intended water use reductions. The City is not a wholesale water supplier and thus this discussion is not required, however, it is important to note that the City is in the process of retrofitting, and installing water meters, especially among its residential accounts. These unmetered residential users comprise a large percentage of the City's overall water use. Commercial and Industrial users have historically been metered. Metering will greatly improve the City's ability to monitor and manage residential demand. Metering has been shown to make water users more conscious of their water use and to foster conservation, often leading to reductions in per capita use. Furthermore, if necessary, a tiered rate structure that eliminates waste or unreasonable uses of water could be implemented. Such rate structures have historically been shown to be effective in reducing wasteful or excessive water use practices and reducing per capita daily use.

4. System Supplies:

4.1 Water Sources

The City has eight operating supply wells providing water for the entire system. One of the most recent well (Well 14) was constructed in the northwest portion of the City, primarily to serve the Trilogy development. After installation, however, Well 14 has at times provided the majority of the City's water supply. For instance, from January through April 2007, Well 14 provided an average of 60 percent of the City's total supply.¹ In the second half of 2007, however, Well 13 became the leading pumping well. From May 2007 through November 2007, Well 13 provided nearly half of the City's total supply.² The characteristics of the existing wells, including approximate yield, depth, and year of construction are included in Table A below.

¹ ENGEO, "Progress Report for Hydrogeologic Consultation and Evaluation of Well Data – May 2006 through April 2007". May 18, 2007.

² ENGEO, "Progress Report for Evaluation of Water Supply Well Data – September thru November 2007". April 3, 2008.

TABLE A: CITY OF RIO VISTA EXISTING WATER SUPPLY INFRASTRUCTURE³

Well number	Capacity (gpm)	Installation date	Depth	Screened depths	Notes
7	500	1953	424'	86-406	Operational and its output is 500 gpm.
8	300	1955	492'	84-438	Off-line, with arsenic and mechanical related issues.
9	800	1963	910'	230-780	On-line as a supplemental well and is managed for its operational needs due to odor issues. Its output is 700-800 gpm.
10	1000	1985	520'	230-500	Off-line, is high in arsenic and is only used for fire emergency needs.
11	1200	1995	370'	205-275, 320-350	Operational and is used to blend with other wells. Its output is 1000-1200 gpm.
12	200	1995	452'	380-408, 418-442	Off-line and non-operational at this time due to high intrusion of sand during operations. It has a low output of 200 gpm, and cavitates after running for short periods of time.
13	1200	2003	385'	140-170 190-210 220-280 345-365	Operational and its output is 1200 gpm.
14	800	2005	485'	140-150 195-300 355-385 440-465	Operational and is restricted for blending due to high arsenic levels. Output is 800 gpm.
15	1200	2008	560'	250-280 350-430 520-540	Operational and its output is 1200 gpm.
Total	7200				

³ Source: ENGEO. "Memo to the City of Rio Vista: Hydrogeologic and Available Water Supply Trend Analysis". October 6, 2006. ENGEO. Groundwater Evaluation, City of Rio Vista. June 21, 2002.

There are several private wells that are not connected to the City's potable water system. They are:

1. The deactivated U.S. Army Base since 1989 next to the Sacramento River, that is now owned by the City but not operational at this time.
2. California Vegetable Supply, Inc. and is used for agricultural purposes to grow endive in enclosed buildings.
3. Gomes Excavating, Inc. is not currently being used.
4. There are two wells at the Rio Vista Golf Course that are used only for golf course irrigation purposes.

Rio Vista does not import or export surface water supplies at this time, and it expects to rely on groundwater for the future planning horizon of this UWMP. However, it is important to note that other water supply options are available to the City if needed in the future or in an emergency. Potential supplemental or emergency water sources include the Sacramento River and the North Bay Aqueduct (NBA). An agreement with the Solano County Water Agency (SCWD), which controls the NBA water in Solano County, allows for access to the NBA supplemental water source. However, because Rio Vista is a significant distance from the NBA facility, it is more likely the City would exchange its rights to that water for additional Sacramento River water if needed. Future water sources may include additional wells, recycled water, the Sacramento River, and purchased water from the Solano County Water Agency. For the City to utilize these sources would require additional infrastructure. *See Tables 16 and 17 in Appendix E.*

4.2 Groundwater Source

The City draws its water supply from the Solano subbasin at the southeastern limit of the Sacramento Valley Groundwater Basin. This groundwater basin is currently not adjudicated.

The Solano subbasin is bounded by the Sacramento River to the east, Putah Creek on the north, and the North Mokelumne and San Joaquin rivers on the south and southeast. The western edge of the basin is defined by the hydrologic divide between the Sacramento River and the San Francisco Bay drainages. The Suisun-Fairfield groundwater basin lies immediately to the west of the Solano subbasin. The Solano subbasin also contains at least two distinct freshwater-bearing zones: an upper alluvial layer, ranging from 60-130 feet thick; and the thicker Tehama formation, which provides most of the groundwater used in the area. Additional saline water-bearing formations underlie the Tehama formation. Primary waterways in and bordering the basin include the Sacramento, Mokelumne, and San Joaquin Rivers, the Sacramento River Deep Water Ship Channel, and Putah Creek.

Wells in the upper alluvium can provide substantial yields when situated near the Sacramento River; otherwise, these shallower wells can be relatively low-yielding. Most wells in the Solano subbasin tap the Tehama formation, which ranges from 1,500-2,500 feet thick, and can also provide very high yields of several thousand gallons per minute per well. The USGS has

developed some localized groundwater yield and storage estimates, although those estimates do not apply to the full Solano subbasin or the Tehama formation within Solano County. Appendix A provides the full Solano groundwater subbasin description, from DWR's Bulletin 118 Update.

Within the Solano subbasin, all the basin's municipal groundwater users either have GMPs, or are currently monitoring or studying the groundwater in some manner. The City of Rio Vista and the City of Dixon are engaged in groundwater monitoring and study efforts. The City of Vacaville, Solano Irrigation District (SID), MPWD, and Reclamation District 2068 have adopted groundwater management plans.

In addition, some rural residential landowners have individual shallow groundwater wells that serve their domestic needs. There are also some small rural residential water systems that distribute groundwater to their customers.⁴ The SCWA Integrated Regional Water Management Plan (IRWMP) estimates the groundwater basin supply to be 23,300 acre feet annually (AFA).⁵ There is no trend of groundwater overdraft with current levels of groundwater use.⁶

Average annual precipitation in the basin ranges from approximately 23 inches in the western portion of the subbasin to 16 inches in the eastern portion of the basin. (*California Bulletin 118*).

The City commissioned *ENGEO Incorporated* to prepare a 2002 report titled *Groundwater Evaluation for Rio Vista*. The report reevaluated the groundwater basin in and around the City limits to help determine the future capability of providing water for existing and planned developments. The report concludes that the groundwater basin will likely meet the future groundwater demands established by the projected population growth for the next 20 years. Monitoring the static and pumping levels of the wells in order to better understand the impacts of the increased demand on the aquifer is recommended. Since February 2005, the City has contracted with ENGEO to collect and analyze well monitoring data. Over 60 months of well data have been collected and synthesized. This monitoring indicates that groundwater levels at various wells may fluctuate during particular months or seasonally according to the City's operational use of its array of wells, but that overall well levels and trends remain stable. More data on this monitoring effort is reported below.

California Bulletin 118 discusses the Solano subbasin in detail. There is currently no calculated groundwater budget for the Solano subbasin. A groundwater management plan has not been prepared for the Solano groundwater subbasin. California Bulletin 160, *California Water Plan Update 2005* also provides no indication that the basin is in overdraft conditions.

⁴ Solano County Water Agency. February 2005. Appendix A of *Integrated Regional Water Management Plan and Strategic Plan*.

⁵ Solano County Water Agency. February 2005. *Integrated Regional Water Management Plan and Strategic Plan*, p. 3-8.

⁶ Solano County Water Agency. February 2005. *Integrated Regional Water Management Plan and Strategic Plan*, p. 3-6.

Water volumes that have been obtained from the service area wells can be found on Table 18 of this report. In addition the volumes that are projected to be pumped are shown on Table 19 of this report. *See Tables 18 and 19 in Appendix E.*

4.3 Transfer Opportunities

Being surrounded by agricultural land, there are no active municipal water supply systems adjacent to the city. Transfer and exchange opportunities are, therefore, limited.

As a member of the Solano County Water Authority, the City of Rio Vista eventually will hold rights to up to 1,500 acre feet of water from the North Bay Aqueduct (NBA). It is important to note that the 1,500 acre-foot value is a maximum amount that would vary depending on hydrology and State Water Project (SWP) allocation. Currently, the SWP estimates that on average it can deliver approximately 60-70 percent of full contractual amounts. (See SWP Reliability Report issued by DWR.) However, the City's location is some distance from an available NBA connection. This makes it unlikely that the City will use the NBA as a direct source of water supply because the cost to construct intertie and conveyance facilities would be very costly considering the City's population and funding. However, the possibility exists for the City to make an agreement to transfer or exchange this contractual water right for Sacramento River water diversions with the Solano County Water Agency or another entity within its service area. Even in such a scenario, the City would need to develop infrastructure to divert and use the Sacramento River water. Because of the additional costs of infrastructure and the fact that the City's existing groundwater supplies are considered adequate to provide reliable water supplies throughout the planning horizon of this UWMP, these additional supplies are not needed to meet future, projected demands. These opportunities for additional supplies are mentioned here in the spirit of full disclosure and compliance with the UWMP Act, and for purposes of documenting that if an emergency need arises, or if future City water demands unforeseeably increase substantially above those projected here, the NBA or Sacramento River supplies could be developed. In an emergency, the costs of temporary infrastructure would likely be less than permanent facilities and funding could be provided by the state or federal government.

See Table 20 in Appendix E.

4.4 Desalinated Water Opportunities

The City is not located near a supply of water high in total dissolved solids (TDS) that would warrant or allow for the development of a desalination facility; therefore, desalinated water is not feasible and is not discussed further in this plan.

4.5 Recycled Water Opportunities

Because of the City's small size and the relatively abundant groundwater supplies that it has enjoyed, there has been little effort historically to develop or utilize recycled water. However, the City has considered and would be amenable to recycled water use in the future. The City of Rio Vista has two waste water treatment plants. Information for the volumes of effluent treated can be found in Tables 21 and 23 in Appendix E. As indicated, the total amount of effluent treated is 235.4 million gallons of waste water per year. Only one-third is treated to drinking

water standards but due to the lack of redundancy in the process, it is not considered up to drinking water standards. No water from these two treatment facilities is currently being recycled and used within the service area boundaries. All treated water is currently discharged into the Sacramento River.

Potential recycled water customers exist in the City and surrounding areas. In the future, the City hopes to develop these opportunities if they are cost effective. For instance, local agriculture would be the largest potential user of recycled water. Other potential applications for recycled water include green belts and common areas in large developments as they are built. For instance, the Trilogy development and its surrounding golf course is intended to be a primary user of recycled water. Infrastructure has been installed; however, more development will be needed to fully implement the usage of non-potable recycled water at that location and future locations around the City. Additionally, the Del Rio Hills PUD has a potential recycled water demand of approximately 340 AFA to serve landscape areas, open space, and roadway irrigation. The City currently does not have the funding to develop all possible recycled water infrastructure, but is actively seeking and will continue to seek out innovative funding and grant opportunities from private and government sources.

4.6 Future Water Projects

At this time, the City has no projects for the development of additional water supply planned. The current array of wells is expected to meet short-term water demands. However, as demands increase, the City will monitor existing groundwater well production and capacity and construct additional wells if needed to satisfy future demands in the service area. The City's 2003 Water Master Plan projected that approximately 15 wells would be required to meet future full planned growth and development. This would involve adding nine 1,000 gpm wells to the City's existing system. As mentioned earlier, the City has contracted for ongoing well monitoring and reporting with ENGEO, Incorporated.

See Table 26 in Appendix E.

5. Water Supply Reliability and Water Shortage Contingency Planning:

5.1 Water Supply Reliability

The City has a single source of water, the Solano groundwater subbasin. The City has used this supply since the City was incorporated in 1893. Historically, the City's groundwater supply has been able to fully satisfy demand during single-year and extended-period droughts. For the reasons explained below, the City concludes that it can meet current and future demands with its existing groundwater supply (subject to development of additional wells if needed). Because the groundwater basin does not have a water budget, and the City is experiencing a lull in development, this UWMP uses an increase in water usage (gpcd) based on a 10 year average of water delivered and projected to the year 2020. *See Tables 27 and 28 in Appendix E.*

Based on historical pumping records and ongoing monitoring data and regional management programs, the City is confident that its water demands can continue to be met with local groundwater from the Solano subbasin. The history of the basin is valuable to understand this conclusion. Historically, the area overlying the subbasin was used extensively for agricultural

production. Early agricultural users relied heavily on groundwater, and over time the aquifer was depleted and groundwater levels lowered. The Solano Project was built to alleviate groundwater concerns and provide a supply of high quality surface water to the region. After construction of the Solano Project, groundwater levels in the basin began to rise. By the 1970s and 1980s, groundwater levels had rebounded substantially. Current groundwater levels across the basin are at or near record highs. Most of the hydrographs show a small decline in water levels over the early 1990s, in response to the 1987-1992 drought, but show that water levels also recovered quickly to pre-drought levels.

Recent records from various monitoring wells in the Rio Vista area indicate that groundwater levels are not in decline across the basin, and the DWR does not consider the basin to be in overdraft. Some well records from the Solano subbasin show water levels at or very near ground surface in recent years. These high water levels suggest that the basin is at the point of rejecting additional recharge. Additionally, for the past five years, the City has conducted, through a contract with ENGEO, a multi-year effort to monitor and report on the water levels, water quality, and overall functioning of the City's existing groundwater wells. Data from this monitoring indicates that groundwater levels are not in decline in the Rio Vista area and that well productivity is high and stable.

Overall, it is also important to note that groundwater is the source of only a small portion of water for other water users and suppliers in this basin. Other water users in the Solano subbasin that currently rely on groundwater for some portion of their supply have other sources to rely on, including the NBA. It is likely that the SCWA member agencies will be able to meet planned demands from these sources and thereby decrease reliance on groundwater. Thus, overall groundwater use in the basin is not anticipated to see a significant increase. For instance, the Solano Irrigation District's agricultural water use (both surface and groundwater) is likely to decline over the coming 20 years as municipalities convert areas currently used for agriculture into urbanized areas. Additionally, stable groundwater levels indicate that groundwater withdrawal can increase from the estimated current regional demand of 23,300 AFA⁷ without causing overdraft of the basin.

If monitoring indicates an increase in groundwater withdrawal is beginning to cause groundwater level declines, conjunctive use planning will enable the area's water suppliers, including the City, to limit groundwater withdrawal to sustainable levels. For example, Rio Vista may be able to exchange surface water allocations or purchased supplies with other groundwater users via in-lieu use arrangements. Under such arrangements, the other users would then reduce groundwater pumping to allow Rio Vista to increase withdrawals without causing basin-wide overdraft. In some years, when surface water supplies are limited, more groundwater may be withdrawn, but on a long-term basis groundwater use in the basin can be managed at sustainable levels for the City's anticipated growth. Groundwater management efforts, adequate overall regional supplies,

⁷ Based on recent historical groundwater use from Dixon, Rio Vista, Vacaville and SID. SID and Vacaville planned demands are anticipated to be met primarily with increased surface water supplies. Solano County Water Agency. February 2005. Appendix A of the *Integrated Regional Water Management Plan and Strategic Plan*.

and the ability of the SCWA agencies to exchange and purchase additional surface water supplies will enable proactive management of groundwater supplies over the coming 20 years.

5.2 Water Shortage Contingency Planning

The City does not currently have a Water Shortage Contingency ordinance. A draft resolution is attached in Appendix B, as required in Water Code section 10632(a)(8). As explained elsewhere, a large majority of the City's current water users are not metered. To comply with the mandates of California law, the City intends to convert existing users to meters and meter water usage at these sites in the future. Once meters are installed, the City will consider plans and effective strategies to reduce and apportion water supplies and demands during any water shortage. As explained above, however, the City does not anticipate future water shortages due to supply limitations because the City uses groundwater exclusively for its supply, and therefore the City deems a catastrophic supply interruption very unlikely. One supply interruption scenario could involve a regional power outage, which the City does not expect would last beyond a few days at the most. In that event, the City has back-up generators at each of its well sites to provide the necessary power for continued well operation. To cope with other temporary interruptions in supply, it is important to note that the City has water storage tanks at high elevation points to meet instantaneous demands. Water would be delivered via gravity feed to existing customers. In the event of any catastrophe, the City would immediately notify residents to reduce water use and ration supplies. City buildings and City owned facilities would also discontinue or limit water use.

Water Code section 10632 requires that the City provide "an estimate of the minimum water supply available during each of the next three years based on the driest three-year historic sequence for the agency's water supply." The City does not have specific data regarding the driest three year sequence in its history. In fact, it can be argued what three-year sequence was the driest. Potential periods of notably dry hydrology include 1927-1934, 1975-1977, 1987-1992, and 2008-2010. Given the lack of data from the prior periods, the City has chosen to provide data from the most recent period 2008-2010 because water supply data are available and this period represents a very recent, very dry three-year hydrologic sequence that involved emergency declarations at both the state and local levels. Table 18 indicates that the City pumped an average of 2,704 acre-feet during this period. This amount was adequate to meet demands in those years and did not cause any overdraft, and would be expected to be available in the next three years if similar hydrologic conditions occurred again. Because the City only pumped the amount necessary during 2008-2010, it is unclear how much additional water would be available for pumping, but based on the reasons given in Section 5.1, the City expects that it could pump a significant amount of additional water in the future under similarly dry hydrologic conditions.

Water Code section 10632 also requires a discussion of actions to be undertaken to conserve water and reduce demand in response to up to a 50% reduction in supply. As explained elsewhere, the City has never had to deal with a serious shortage in its groundwater supply. However, the City expects that if such a supply emergency were ever to occur, that it would implement the following measures, which are increasingly restrictive, as necessary and appropriate:

- Publicize the supply shortage and encourage and educate all customers regarding voluntary demand reduction measures.
- Reduce or eliminate all outdoor and landscape irrigation at City properties and parks.
- Prohibit the use of potable water for street cleaning, car washing, and other such practices.
- Implement an alternating or staggered schedule (odd numbered calendar days vs. even days) for residential and commercial irrigation of outdoor landscapes.
- Prohibit all use of potable water for outdoor residential or commercial use on lawns, gardens, and other landscaping.

The above measures could be implemented in stages depending on the severity of the supply reduction. The City would constantly monitor its well production and the daily demand of its customers to judge the efficacy of imposition of each measure and whether additional measures were necessary. The City anticipates that implementation of all the above measures would reduce demand by more than 50%, especially if all outdoor watering is prohibited because the City predominantly serves residential customers and outdoor residential use constitutes a majority of the use of water in residential areas. Such measures would allow continued indoor use of water without any health or safety concerns. Because the City is largely unmetered and collects flat fees from most customers, the above measures would not be expected to cause a significant effect on revenues and rates. Once the City converts to water meters, additional measures such as tiered rate structures and penalties for overuse could be considered.

5.3 Water Quality

The City of Rio Vista has three wells that have arsenic levels at or above the MCL of 10 ppb. These water quality issues are being monitored, and the City engages in careful blending, if necessary, to ensure that all water supplies meet or exceed federal and state quality and safety standards. The City is currently blending two of these wells and producing water below the MCL. The third well has not been put on line since 2008 and a filtration system to remove impurities is currently being designed. These water quality issues are limited and have not impacted the City's ability to satisfy existing demands. They are also not anticipated to affect the City's ability to meet future demands from current or new wells.

5.4 Drought Planning

Because the groundwater basin has not been fully defined and there is no calculated groundwater budget, the nearest recorded potential water source, the Sacramento River, was used to determine the normal year, dry year and multiple dry year periods. Records of flow from the USGS Sacramento River Gauge 11447500 provides the Normal, Single Dry, and Multiple Dry year data as shown in Table 27. Unfortunately, City demand records during those periods are unavailable. Therefore, demand during drought periods is calculated as follows:

- It is assumed that under normal conditions, water demand is approximately five times the low demand in the winter. Therefore, summer water demand accounts for two-thirds of the total yearly demand.
- It is also assumed that summer demand doubles during drought conditions. This is a highly conservative assumption, as the City does not have large swaths of greenbelts or large irrigation customers.
- Using the two assumptions above results in yearly drought demand that is 33% higher than normal demand.

See Tables 27 and 28 in Appendix E.

The City does not currently have a Drought Contingency or Water Supply Reliability plan. As explained above, the City anticipates that its groundwater supply will be adequate to meet existing and projected demands during droughts. The City has mandatory measures that can be imposed during drought years such as reduction or elimination of landscape watering of City owned land, public schools and cemeteries. As explained above, however, the City's current focus is to convert existing water users to meters to comply with California law. Installation of water meters will enable the City to develop strategies and plans to prepare for and cope with possible drought situations. Emergency measures discussed above are not expected to be necessary, but the option for emergency infrastructure, or for direct or in lieu exchange with other water users in the SCWA service area, adds an additional margin of safety in the most extreme, unforeseeable circumstances.

6. Demand Management Measurement:

Demand Management Measures are ways to conserve water through efficient tools, education, and incentives. Currently there are 14 best management practices (BMPs) that are promoted by California Urban Water Conservation Council (CUWCC). The City is not a current signatory to the California Urban Water Conservation Council, but it is considering participation in, or collaboration with, the California Urban Water Conservation Council and routinely reviews reports and recommendations issued by that organization.

Each of the BMPs promoted by CUWCC is discussed below with an indication of whether the City is currently implementing these measures. If not, a brief discussion of the feasibility of the BMP is provided. As stated above, the City's primary goal in the next five years is to convert as many existing unmetered connections to meters as possible and to repair and maintain portions of its infrastructure. Given the challenges and costs associated with these measures, the City has had to defer implementation of some other BMPs that would not provide the significant management flexibility and improvement in water use monitoring, education, and reduction as conversion to meters would.

6.1 Water Survey Programs for Residential Customers

The City has not developed an independent survey program of single or multifamily residential customers to detect leaks. The City may consider beginning a water survey program to increase the visibility of the Public Works services. Such information could also be supplied as a leaflet

in the monthly water bill. The City is currently evaluating options, but is also mindful of the additional costs of implementing such a program.

6.2 Residential Plumbing Retrofit

The City will be adopting the 2010 California Green Building Standards Code, and the 2010 California Plumbing Code, which specify various mandatory water conservation measures for residential uses including 1.28 gallon water closets and 0.5 gallon urinals after July 1, 2011.

6.3 System Water Audits

The City has an active SCADA system monitoring the City's water well activity and other parameters. City employees are also highly knowledgeable about the existing system. The City has been retrofitting the existing residential meters that have been installed in the newer subdivisions. Staff has begun reading meters, logging data, and billing those accounts. Additionally, the City has been successful in continually detecting and repairing leaking water mains in a timely fashion to assist in conservation and consistent water deliveries.

6.4 Commodity Rate Metering

The City has just recently purchased a meter reading system to begin reading existing meters, and is in the process of implementing this new system. As stated above, the City is anticipating installation of new meters to customers who in the past had none. This was due, in part, to the recommendations of the 2003 Water Master Plan.

6.5 Large Landscape Conservation

On March 19, 2009, the City Council adopted Ordinance No. 643, adopting a water conservation and landscape ordinance to achieve water conservation through proper plant selection, installation and maintenance practices for landscaping associated with new commercial, industrial, institutional, mixed-use, common areas, multiple family, and new single family dwellings.

6.6 High Efficiency Washing Machines

The City may consider participating in a regional program that provides Residential High-Efficiency Clothes Washer Vouchers. The City is investigating its options and the potential for participation.

6.7 Public Information Program

The City provides information to the public on a regular basis through the use of the City's internet homepage, mailings, and public meetings.

6.8 School Education Programs

The City does not have a School Education program at this time. During these difficult fiscal times, the City has had to prioritize available funding and has directed funds collected from

water user rates to more important and critical objectives such as repair, maintenance and monitoring.

6.9 Conservation Programs for Commercial, Industrial, and Institutional Accounts

On March 19, 2009, the City Council adopted Ordinance No. 643, adopting a water conservation and landscape ordinance to achieve water conservation through proper plant selection, installation and maintenance practices for landscaping associated with new commercial, industrial and institutional uses.

6.10 Conservation Pricing

The City does not have a Conservation Pricing program. Implementation of such a program is currently infeasible and would be ineffective because the majority of the City's water users are not metered. The City will convert these users to meters – a process that the City expects to complete by 2015. Once all users are on meters as required by California law, then the City will consider conservation pricing options.

6.11 Wholesale Agency Programs

The City is not a Wholesale Agency.

6.12 Water Conservation Coordinator

Rio Vista's Planning Division reviews all new landscape plans for compliance with the City's water conservation and landscape ordinance, and inspects the landscaping for conformance with the approved plans. This review program has been a cost effective way for the City to reduce demands and encourage water conservation.

6.13 Waste Water Prohibition

The City does not have a Waste Water Prohibition Program.

6.14 Residential Plumbing Retrofit

The City will be adopting the 2010 California Green Building Standards Code, and the 2010 California Plumbing Code, which specify various mandatory water conservation measures for residential uses including 1.28 gallon water closets and 0.5 gallon urinals after July 1, 2011.

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